

WE CLAIM:

1. A suturing instrument comprising:  
2 an elongate body member having a longitudinal axis;  
a suture deployment system located within a distal end  
4 portion of said elongate body member wherein said distal  
end portion includes a suture exit port, said suture  
6 deployment system comprising:  
a curved suture carrier channel; and  
8 a curved suture carrier movably positioned in  
said curved suture carrier channel;  
10 and  
a deployment controller having a proximal end, a  
12 distal end, a retracted position and a deployed position,  
said deployment controller extending substantially along  
14 the longitudinal axis of said elongate body member to the  
distal end of said elongate body member where it is coupled  
16 to said curved suture carrier and moves said curved suture  
carrier through said curved suture carrier channel as it  
18 moves between said retracted position and said deployed  
position, said curved suture carrier channel configured  
20 within said distal end portion of said elongate body member  
such that said curved suture carrier exits said suture exit  
22 port and is guided along a path which includes a proximal  
curved path segment such that a surface of said curved  
24 suture carrier is substantially adjacent with an outer  
surface of said distal end portion of said elongate body  
26 member along said proximal curved path segment.

2. A suturing instrument as defined in Claim 1 further  
2 comprising a suture catch positioned proximate to said distal  
end portion of said elongate body member such that a distal path  
4 segment of said curved suture carrier path is intercepted by  
~~said suture catch as said deployment controller approaches said~~  
6 deployed position.

3. A suturing instrument as defined in Claim 1 further  
2 comprising a surgical needle positioned in a distal end of said  
curved suture carrier.

4. A suturing instrument as defined in Claim 3 wherein  
2 said surgical needle further comprises a bullet needle.

5. A suturing instrument as defined in Claim 1 wherein:  
2 said curved suture carrier channel and said curved  
suture carrier are located in a distal tip assembly of said  
4 elongate body member; and  
said distal tip assembly is joined with said elongate  
6 body member such that said distal tip assembly is free to  
rotate axially about said elongate body member longitudinal  
8 axis.

6. A suturing instrument as defined in Claim 1 wherein  
2 said deployment controller is coupled to said curved suture  
carrier with a flexible driver member.

7. A suturing instrument as defined in Claim 6 wherein  
2 said flexible driver member further comprises an alloy of nickel  
and titanium.

8. A suturing instrument comprising:  
2 a body member;  
a suture exit port formed in said body member;  
4 a curved suture carrier channel formed in said body  
member; and  
6 a curved suture carrier movably positioned in said  
curved suture carrier channel, wherein said curved suture  
8 carrier has a retracted position such that said curved  
~~suture carrier is positioned within an interior region of~~  
10 said body member and a deployed position such that a  
portion of said curved suture carrier is positioned  
12 exterior to said body member, said curved suture carrier  
configured within said curved suture carrier channel such

14       that said curved suture carrier exits said interior region  
16       of said body member through said suture exit port and is  
18       guided along a path which includes a proximal curved path  
      segment wherein a surface of said curved suture carrier is  
      substantially adjacent with an outer surface of said body  
      member along said proximal curved path segment.

9.   A suturing instrument as defined in Claim 8 further  
2    comprising a suture catch positioned on said body member such  
      that a distal path segment of said curved suture carrier path is  
4    intercepted by said suture catch.

10.   A suturing instrument as defined in Claim 8 further  
2    comprising a surgical needle positioned in a distal end of said  
      curved suture carrier.

11.   A suturing instrument as defined in Claim 10 wherein  
2    said surgical needle further comprises a bullet needle.

12.   A suturing instrument comprising:  
2       an elongate body member having a longitudinal axis;  
      a distal tip suture deployment assembly joined with a  
4       distal end of said elongate body member such that said  
      distal tip assembly is free to rotate axially about said  
6       elongate body member longitudinal axis, said distal tip  
      suture deployment assembly comprising:  
8           a distal tip body member;  
          a suture exit port formed in said distal tip body  
10          member;  
          a curved suture carrier channel formed in said  
12          distal tip body member; and  
          a curved suture carrier movably positioned in  
14          said curved suture carrier channel;  
      and  
16       a deployment controller having a proximal end, a  
      distal end, a retracted position and a deployed position,  
18       said deployment controller extending substantially along

the longitudinal axis of said elongate body member to the  
20 distal end of said elongate body member where it is coupled  
to said distal tip suture deployment assembly and moves  
22 said curved suture carrier through said curved suture  
carrier channel as it moves between said retracted position  
24 and said deployed position.

13. A suturing instrument as defined in Claim 12 wherein  
2 said distal tip suture deployment assembly is configured to have  
a retracted position such that said curved suture carrier is  
4 positioned within an interior region of said distal tip body  
member and a deployed position where a portion of said curved  
6 suture carrier is positioned exterior to said distal tip body  
member, said curved suture carrier configured within said curved  
8 suture carrier channel such that said curved suture carrier  
exits said interior region of said distal tip body member  
10 through said suture exit port and is guided along a path which  
includes a proximal curved path segment wherein a surface of  
12 said curved suture carrier is substantially adjacent with an  
outer surface of said distal tip body member along said proximal  
14 curved path segment.

14. A suturing instrument as defined in Claim 12 further  
2 comprising a suture catch positioned on said distal tip body  
member such that a distal path segment of said curved suture  
4 carrier path is intercepted by said suture catch as said  
deployment controller approaches said deployed position.

15. A suturing instrument as defined in Claim 13 further  
2 comprising a suture catch positioned on said distal tip body  
member such that a distal path segment of said curved suture  
4 carrier path is intercepted by said suture catch as said  
~~deployment controller approaches said deployed position.~~

16. A suturing instrument as defined in Claim 12 further  
2 comprising a surgical needle positioned in said distal end of  
said curved suture carrier.

17. A suturing instrument as defined in Claim 16 wherein  
2 said surgical needle further comprises a bullet needle.

18. A method for placing a suture in thin tissue adjacent  
2 bone structure comprising:

placing a suturing instrument which encloses a curved  
4 suture carrier which is movably positioned within a curved  
suture carrier channel adjacent the tissue to be sutured;  
6 and

deploying the curved suture carrier out of the  
8 suturing instrument through an exit port such that the  
curved suture carrier exits an interior region of said  
10 suturing instrument through said exit port along a path  
which approaches being substantially tangential to an outer  
12 surface of said suturing instrument surrounding said exit  
port.

19. A suturing instrument comprising:

2 a body member;  
an exit port formed in said body member;  
4 a curved suture carrier channel formed in said body  
member; and

6 a curved suture carrier movably positioned in said  
curved suture carrier channel, wherein said curved suture  
8 carrier has a retracted position such that said curved  
suture carrier is positioned within an interior region of  
10 said body member and a deployed position such that a  
portion of said curved suture carrier is positioned  
12 exterior to said body member, said curved suture carrier  
configured within said curved suture carrier channel such  
14 that said curved suture carrier exits said interior region  
of said body member through said exit port along a path  
16 ~~which approaches being substantially tangential to an outer~~  
surface of said body member surrounding said exit port.

20. A suturing instrument comprising:

2       an elongate body member having a longitudinal axis;  
      a suture deployment system located within a distal end  
4       portion of said elongate body member wherein said distal  
      end portion includes a suture exit port, said suture  
6       deployment system comprising:  
      a curved suture carrier channel; and  
8       a curved suture carrier movably positioned in  
      said curved suture carrier channel;

10      and

      a deployment controller having a proximal end, a  
12      distal end, a retracted position and a deployed position,  
      said deployment controller extending substantially along  
14      the longitudinal axis of said elongate body member to the  
      distal end of said elongate body member where it is coupled  
16      to said curved suture carrier and moves said curved suture  
      carrier through said curved suture carrier channel as it  
18      moves between said retracted position and said deployed  
      position, said curved suture carrier channel configured  
20      within said distal end portion of said elongate body member  
      such that said curved suture carrier exits said suture exit  
22      port along a path which approaches being substantially  
      tangential to an outer surface of said body member  
24      surrounding said suture exit port.

21. A suturing instrument as defined in Claim 20 further  
2       comprising a suture catch positioned proximate to said distal  
      end portion of said elongate body member such that a distal path  
4       segment of said curved suture carrier path is intercepted by  
      said suture catch as said deployment controller approaches said  
6       deployed position.

~~22. A suturing instrument as defined in Claim 20 further~~  
2       comprising a surgical needle positioned in a distal end of said  
      curved suture carrier.

23. A suturing instrument as defined in Claim 22 wherein  
2 said surgical needle further comprises a bullet needle.

24. A suturing instrument as defined in Claim 20 wherein:  
2 said curved suture carrier channel and said curved  
suture carrier are located in a distal tip assembly of said  
4 elongate body member; and  
said distal tip assembly is joined with said elongate  
6 body member such that said distal tip assembly is free to  
rotate axially about said elongate body member longitudinal  
8 axis.

25. A suturing instrument as defined in Claim 20 wherein  
2 said deployment controller is coupled to said curved suture  
carrier with a flexible driver member.

26. A suturing instrument as defined in Claim 25 wherein  
2 said flexible driver member further comprises an alloy of nickel  
and titanium.